TOBAM* CORE INVESTMENTS

DIVERSIFICATION DASHBOARD

June 2016

Diversification Ratios®

TOBAM's Diversification Ratio® (DR) measures to what extent a portfolio is diversified. The DR² (square of the diversification ratio) measures the number of effective degrees of freedom to which a portfolio is exposed.
As the table shows, the "broad market" indices leave diversification on the table. In addition to a snapshot of each market's DR2, the table shows the DR2 of a well-diversified portfolio, and the fraction of available diversification used by the index.

Universes	DR² Index diversification	DR² Maximum diversification®	% diversification used by index
All Countries World	3.82	11.47	33.3%
World	3.57	10.66	33.5%
Canada	3.41	8.84	38.6%
Emerging Markets	3.69	7.38	50%
US Equity	2.47	5.84	42.4%
Pacific Ex-Japan	2.09	4.65	44.9%
UK Equity	2.09	3.52	59.3%
EMU	1.73	3.32	52.1%
Japan	1.73	3.00	57.6%
US Credit	2.75	3.79	72.7%

Source: TOBAM, figures as of May 31, 2016

The evolution of stocks' correlations after an IPO

In this Diversification Dashboard, we analyse the evolution of the correlations of companies that underwent an Initial Public Offering ("IPO") in the US stock market. The analysis considers in particular:

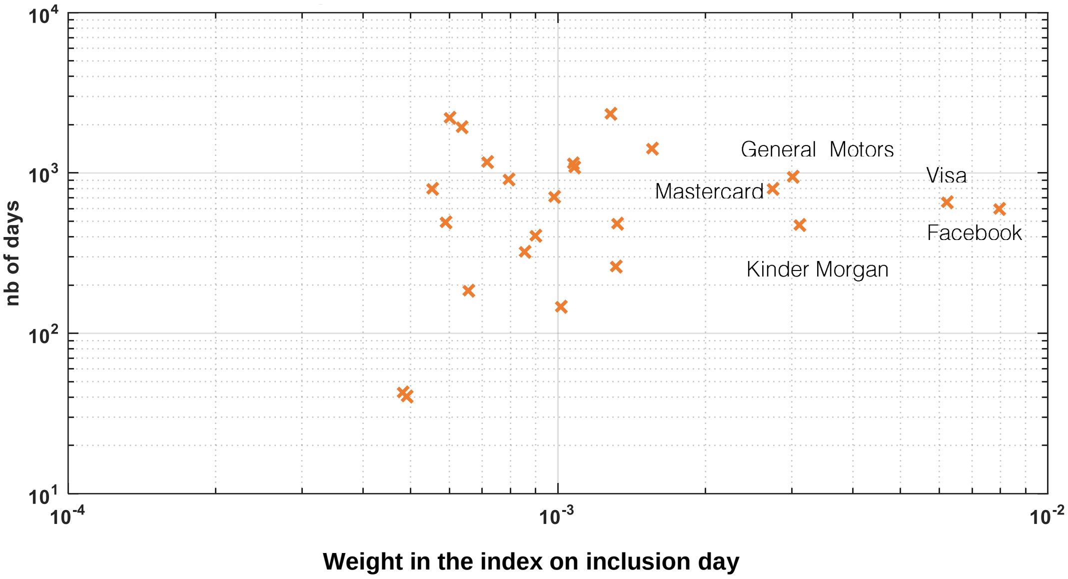
- *the average time for a company to be included in a large cap index after its IPO,*
- *the average time for a stock to reach a steady correlation regime after its IPO.*

This dashboard also serves as a reminder about how TOBAM's Anti-Benchmark® investment process deals with IPOs.

1. How long does it take for a stock to be included in a large cap index after its IPO?

Analysing IPOs in the US over the last 10 years (31/01/2006 to 31/01/2016), we depict in Chart 1 below the duration between a company's IPO and the date of its inclusion into the S&P 500 index, as a function of its weight in the index on the day of its inclusion.

Chart 1: Duration between IPO and inclusion in the S&P 500 vs. Weight in the index on inclusion day



Source: TOBAM, Bloomberg, data from 31/01/2006 to 31/01/2016.

From our sample, it takes an average of almost 2.5 years after the IPO before the company enters into the S&P 500 index.

A few notable examples are:

- Facebook went public on 17/05/2012 whereas it was included in the S&P 500 on 31/12/2013, 593 days after its IPO (1.6 years).
- Google was included in the S&P 500, 591 days after its IPO (1.6 years).
- Visa was added to the S&P 500, 638 days after its IPO (1.7 years).

We give some additional examples in Chart 1.

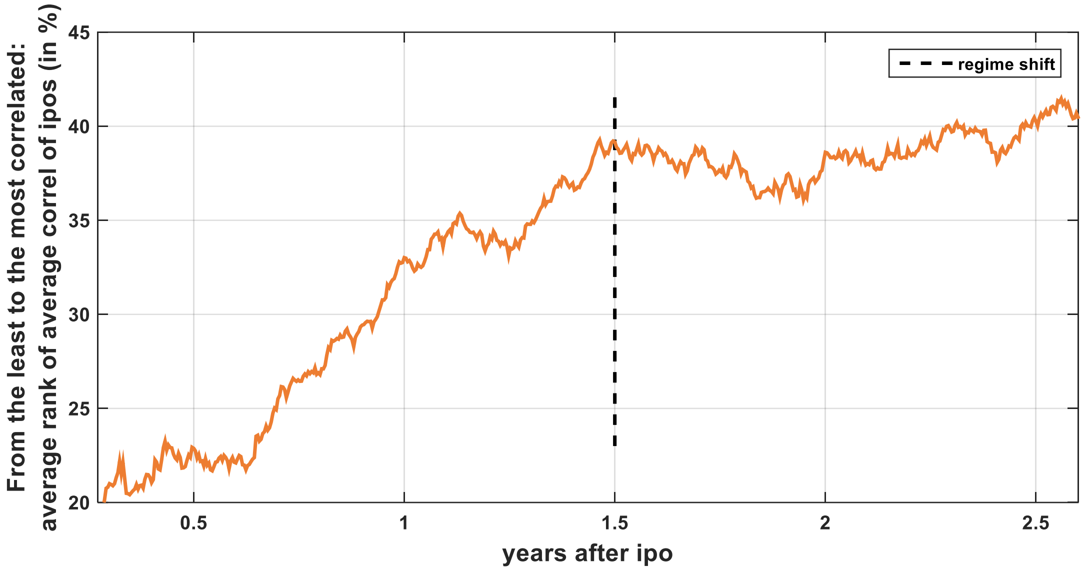
As a side result, within the S&P 500 index, the length of time for a company that went public to enter the index is not strongly related to its market capitalization.

2. How long does it take for a company post IPO to reach a steady correlation regime?

In order to have a larger sample universe, we have considered the RUSSELL1000 and the 1 018 IPOs that occurred for the stocks that were included in this universe between February 1995 and December 2015.

For each stock in the universe, we compute its 3-month rolling average correlation to all the other stocks in the universe, and rank the average correlation for each given date (from the least correlated to the most correlated). Chart 2 depicts the evolution of the average correlation rank of companies after their IPO.

Chart 2: Average rank of average correlation of IPO'd stocks vs. years after IPO

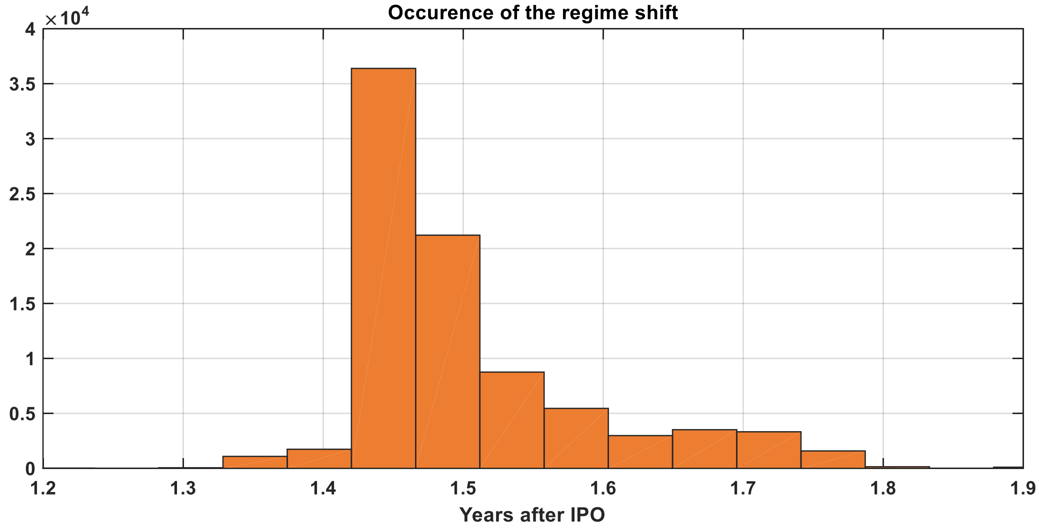


Source: TOBAM, Bloomberg, data from 28/02/1995 to 31/12/2015.

One can observe that, following its IPO, a stock has on average a very low average correlation to the other stocks of the universe as it resides amongst the 20-25% least correlated stocks. **The correlation then starts to rise significantly until it reaches a steady level about 1.5 years after the IPO.** This steady regime may reflect a market consensus on the activities of the company. It is also worth noting that, even 2.5 years after its IPO, these stocks remain on average in the least correlated half of the RUSSELL1000.

To validate the robustness of the estimation of the regime shift, we perform a bootstrap[1] analysis that yields the empirical distribution depicted in Chart 3. This indicates that the regime twist happens almost surely between 1.4 and 1.6 years after an IPO.

Chart 3: Distribution of the regime twist obtained by bootstrapping



Source: TOBAM, Bloomberg, data from 28/02/1995 to 31/12/2015.

[1] In statistics, *bootstrapping* refers to a method that permits the computation of an empirical distribution of a statistic estimator by sampling with replacement.

Combining the result of this Section 2 with the discussion of Section 1, we can conclude that after an IPO, a stock's **average correlation will reach a steady regime one year before the company is actually included in a large cap index such as the S&P 500.**

3. How does the Anti-Benchmark® investment process deal with IPOs?

TOBAM's patented Anti-Benchmark® approach aims to maximize diversification when selecting stocks in the investment universe. By construction, to be diversified, the Anti-Benchmark® portfolios pick in general lowly correlated stocks.

As a result of our analysis, we observe that companies right after their IPOs, exhibit a low average correlation which would make them desirable from a diversification point of view. However, this low correlation level is unsustainable as it increases significantly after a period of time to reach a steadier regime. This steadier regime may reflect a consensus over the activities of the company recently gone public and is reached in general *before* it is included in a large cap index such as the S&P 500.

One may therefore wonder whether our investment strategy tends to select stocks soon after they went public and before their correlation regime is steady.

As a general investment rule, the Anti-Benchmark® portfolios:

- do not invest in off-benchmark stocks,
- do not invest in stocks which have less than 1-year of daily data.

As a consequence and on average, any company that recently went public cannot be considered for inclusion in the Anti-Benchmark® portfolios before this consensus has been reached, especially over the period closely after the IPO where the stock exhibits a very low but unstainable average correlation.

These results hold on average since a recently IPO's company may still be included in the index very quickly: over the last ten years, only six such companies were included in the S&P 500 in less than a year.

For more information

TOBAM is an asset management company offering innovative investment capabilities whose aim is to maximize diversification. TOBAM's Maximum Diversification® approach, supported by original, patented research and a mathematical definition of diversification, provides clients with diversified core exposure, in both the equity and fixed income markets. The company manages $8 billion (as of March 2016) via its Anti-Benchmark® strategies in Equities and Fixed Income. Its team includes 43 investment professionals.

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